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09/923,341	08/08/2001	Gillian F. Marshall	124-880	2769

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EXAMINER

NGUYEN, JOSEPH H

ART UNIT PAPER NUMBER

2815

DATE MAILED: 12/16/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Applicati n N .

09/923,341

Applicant(s)

MARSHALL ET AL.

Examiner

Joseph Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 01 November 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-50 is/are pending in the application.
- 4a) Of the above claim(s) 15-37 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 and 38-50 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 1 and 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Sahara et al

Regarding claim 1, Sahara et al discloses on figure 13B a photo-detector circuit comprising a photodiode detector said photo detector having a PN structure with a p type and n type active regions 163, 164; and an associated readout circuit (col. 23, lines 47-48), said circuit incorporates a CMOS component, supporting at least one deposited epitaxial layer 164 which is one of said active regions of the photodiode detector and including a guard ring 165 delimiting and surrounding the photo-detector for enhancing electric field uniformity and inhibiting breakdown.

Regarding claim 7, Sahara et al discloses on figure 13B the photo-circuit is arranged to provide a logarithmic response to incident radiation.

***Claim R ejections - 35 USC § 103***

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sahara et al as applied to claim 1 above, and further in view of Inoue et al.

Regarding claim 2, Sahara et al disclose substantially all the structure set forth in the claimed invention except a substrate insulated from CMOS circuitry. However, Inoue et al discloses on figure 2 a substrate 101 insulated from CMOS circuitry 117. In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sahara et al by having a substrate insulated from CMOS circuitry for the purpose of reducing the leakage current in a CMOS photodiode device.

Regarding claims 4-6, Sahara et al and Inoue et al together disclose the structure set forth in claims 4-6.

Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sahara et al as applied to claim 1 above, and further in view of Okabayashi et al.

Regarding claim 8, Sahara et al disclose substantially all the structure set forth in the claimed invention except parasitic photo-diodes arranged to contribute to circuit output in response to incident radiation. However, Okabayashi et al discloses on figure 10 parasitic photo-diodes arranged to contribute to circuit output in response to incident

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radiation. In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sahara et al by having parasitic photo-diodes arranged to contribute to circuit output in response to incident radiation for the purpose of increasing the signal to noise ratio as taught by Okabayashi et al (col. 2, lines 47-48).

Regarding claim 9, Sahara et al disclose substantially all the structure set forth in the claimed invention except amplifier arranged to provide feedback to stabilize photo-diode detector. However, Okabayashi et al discloses on figure 10 amplifier arranged to provide feedback to stabilize photo-diode detector. In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sahara et al by having amplifier arranged to provided feedback to stabilize photo-diode detector for the purpose of increasing the signal to noise ratio as taught by Okabayashi et al (col. 2, lines 47-48).

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sahara et al and Okabayashi et al as applied to claim 9 above, and further in view of Fossum et al.

Regarding claim 10, Sahara et al and Okabayashi et al disclose substantially all the structure set forth in the claimed invention except a load transistor. However, Fossum et al discloses a load transistor. In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify

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Sahara et al and Okabayashi et al by having a load transistor for the purpose of improving the performance of a CMOS photo-diode device.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sahara et al and Okabayashi et al and Fossum et al as applied to claim 10 above, and further in view of Uchida et al.

Regarding claim 11, Sahara et al and Okabayashi et al and Fossum et al disclose substantially all the structure set forth in the claimed invention except the amplifier being a push pull amplifier. However, Uchida et al discloses a push pull amplifier (col. 2, line 41). In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sahara et al and Okabayashi et al and Fossum et al by having the amplifier being a push pull amplifier for the purpose of improving the performance of a CMOS photo-diode device.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sahara et al and Okabayashi et al and Fossum et al as applied to claim 10 above, and further in view of Kozlowski.

Regarding claim 12, Sahara et al and Okabayashi et al and Fossum et al disclose substantially all the structure set forth in the claimed invention except a cascode transistor. However, Kozlowski discloses on figure 3 a cascode transistor Q28. In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sahara et al and Okabayashi et al and

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Fossum et al by having would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sahara et al and Okabayashi et al and Fossum et al by having a cascode transistor for the purpose of improving the performance of a CMOS photo-diode device.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sahara et al as applied to claim 1 above, and further in view of Inoue et al and further in view of Cunningham et al.

Regarding claim 13, Sahara et al disclose substantially all the structure set forth in the claimed invention except a substrate insulated from CMOS circuitry. However, Inoue et al discloses on figure 2 a substrate 101 insulated from CMOS circuitry 117. In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sahara et al by having a substrate insulated from CMOS circuitry for the purpose of reducing the leakage current in a CMOS photodiode device.

Sahara et al and Inoue et al disclose substantially all the structure set forth in the claimed invention except the photo-diode being a PIN structure. However, Cunningham et al discloses on figure 2 the photo-diode detector being a PIN structure 26. In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sahara et al and Inoue by having the photo-diode being a PIN structure for the purpose of improving the performance of a CMOS photo-diode device.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sahara et al and Inoue et al and Cunningham et al as applied to claim 31 above, and further in view of Morikawa et al.

Regarding claim 14, Sahara et al and Inoue et al and Cunningham et al disclose substantially all the structure set forth in the claimed invention except the undoped epitaxial layer being of SiGe alloy. However, Morikawa et al discloses on figure 3A the undoped epitaxial layer 14 being of SiGe. In view of such teaching, it would have been obvious to one of the ordinary skill in the art at the time the invention was made to modify Sahara et al and Inoue et al and Cunningham et al by having the undoped epitaxial layer being of SiGe alloy for the purpose of improving the performance of a CMOS photo-diode device.

Claim 38, 40-43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sahara et al in view of Cunningham et al.

Regarding claims 38, 40-43, Sahara et al disclose on figure 13B substantially all the structure set forth in the claimed invention except the photo-diode being a PIN structure. However, Cunningham et al discloses on figure 2 the photo-diode detector being a PIN structure 26. In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sahara et al by having the photo-diode being a PIN structure for the purpose of improving the performance of a CMOS photo-diode device.



Claims 39, 3, 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sahara et al and Cunningham et al as applied to claim 38 above and further in view of Inoue et al.

Regarding claim 39, 3, 49, Sahara et al and Cunningham et al disclose substantially all the structure set forth in the claimed invention except a substrate insulated from CMOS circuitry. However, Inoue et al discloses on figure 2 a substrate 101 insulated from CMOS circuitry 117. In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sahara et al and Cunningham et al by having a substrate insulated from CMOS circuitry for the purpose of reducing the leakage current in a CMOS photodiode device.

Claims 44-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sahara et al and Cunningham et al as applied to claim 38 above and further in view of Okabayashi et al.

Regarding claim 44, Sahara et al and Cunningham et al disclose substantially all the structure set forth in the claimed invention except parasitic photo-diodes arranged to contribute to circuit output in response to incident radiation. However, Okabayashi et al discloses on figure 10 parasitic photo-diodes arranged to contribute to circuit output in response to incident radiation. In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sahara et al and Cunningham et al by having parasitic photo-diodes arranged to contribute to circuit

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output in response to incident radiation for the purpose of increasing the signal to noise ratio as taught by Okabayashi et al (col. 2, lines 47-48).

Regarding claims 45-46, Sahara et al and Cunningham et al disclose substantially all the structure set forth in the claimed invention except amplifier arranged to provide feedback to stabilize photo-diode detector. However, Okabayashi et al discloses on figure 10 amplifier arranged to provide feedback to stabilize photo-diode detector. In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sahara et al and Cunningham et al by having amplifier arranged to provided feedback to stabilize photo-diode detector for the purpose of increasing the signal to noise ratio as taught by Okabayashi et al (col. 2, lines 47-48).

Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sahara et al and Cunningham et al and Okabayashi et al as applied to claim 46 above and further in view of Uchiba et al.

Regarding claim 47, Sahara et al and Cunningham et al and Okabayashi et al disclose substantially all the structure set forth in the claimed invention except the amplifier being a push pull amplifier. However, Uchida et al discloses a push pull amplifier (col. 2, line 41). In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sahara et al and Cunningham et al and Okabayashi et al by having the amplifier being a push pull amplifier for the purpose of improving the performance of a CMOS photo-diode device.

Claim 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sahara et al and Cunningham et al and Okabayashi et al as applied to claim 46 above and further in view of Kozlowski.

Regarding claim 48, Sahara et al and Cunningham et al and Okabayashi et al disclose substantially all the structure set forth in the claimed invention except a cascode transistor. However, Kozlowski discloses on figure 3 a cascode transistor Q28. In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sahara et al and Cunningham et al and Okabayashi et al by having would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sahara et al and Cunningham et al Okabayashi et al by having a cascode transistor for the purpose of improving the performance of a CMOS photo-diode device.

Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sahara et al and Cunningham et al as applied to claim 49 above and further in view of Morikawa et al.

Regarding claim 50, Sahara et al and Cunningham et al disclose substantially all the structure set forth in the claimed invention except the undoped epitaxial layer being of SiGe alloy. However, Morikawa et al discloses on figure 3A the undoped epitaxial layer 14 being of SiGe. In view of such teaching, it would have been obvious to one of the ordinary skill in the art at the time the invention was made to modify Sahara et al

and Cunningham et al by having the undoped epitaxial layer being of SiGe alloy for the purpose of improving the performance of a CMOS photo-diode device.

### ***Response to Arguments***

Applicant's arguments filed 11/1/2002 have been fully considered but they are not persuasive.

With respect to claims 1 and 7, applicant argues that Sahara et al does not disclose a deposited epitaxial layer that is one of the active regions and a guard ring that surrounds the photodiode portion as recited in now amended claim 1. However, Sahara et al clearly discloses on figure 13B a deposited epitaxial layer 164 that is one of the active regions and a guard ring 165 that surrounds the photodiode portion 163, 164. Note that Sahara et al does not teach that the layer 164 is a diffusion layer as incorrectly indicated by applicant herein. Also, the limitation of claim 7 is merely intended use and does not structurally distinguish from Sahara et al.

With respect to claim 2, the only difference between the claimed invention and Sahara et al is a substrate insulated from CMOS circuitry, and Inoue et al discloses on figure 2 a substrate 101 insulated from CMOS circuitry 117. Therefore, the combination of Sahara et al and Inoue et al would disclose all the structures in claim 2.

With respect to claim 3, applicant argues that Cunningham only discloses a bulk wafer 22 which is not an epilayer being the intrinsic or high field region. However, since claim 3 has been amended to depend from new claim 39, it has been a new type of rejection for claim 3 therein.

With respect to claim 8, applicant argues that the parasitic photodiode PEE of Okabayashi does not contribute to an output signal. However, the term "contribute to an output signal" is merely intended use and does not structurally distinguish from Okabayashi.

With respect to claim 9, applicant argues that Okabayashi does not disclose feedback loop or circuitry, which controls current or voltage. However, claim 9 is only purported to include amplifier arranged to provide feedback to stabilize photodiode detector bias voltage, and Okabayashi discloses on figure 10 amplifier arranged to provide feedback to stabilize photodiode detector. Note that the term "provide feedback to stabilize photodiode detector bias voltage" is merely intended use and does not structurally distinguish from Okabayashi.

With respect to claim 10, applicant argues that none of Sahara or Okabayashi discloses such a feedback loop. However, claim 10 is only purported to include a load transistor in series with the photodiode detector. There is no such feedback loop recited in claim 10. Fossum et al discloses a load transistor. Note that the term "arranged to amplify an output signal from the photodiode detector and to provide feedback to bias a load transistor" is merely intended use and does not structurally distinguish from Okabayashi.

Regarding claims 11-12, there is no such feedback loop recited in the claimed invention.

Regarding claim 13, the only difference between Sahara et al and Inoue et al and the claimed invention is the photodiode being a PIN structure, and Cunningham

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discloses on figure 2 the photodiode detector being a PIN structure. Therefore, the combination of Sahara et al and Inoue et al and Cunningham would read on claim 13 therein.

Regarding claim 14, the only difference between Sahara et al and Inoue et al and Cunningham and the claimed invention is the undoped epitaxial layer being of SiGe alloy, and Morikawa et al discloses on figure 3A the undoped epitaxial layer 14 being of SiGe alloy. Therefore, the combination of Sahara et al and Inoue et al and Cunningham and Morikawa et al would read on claim 13 therein.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

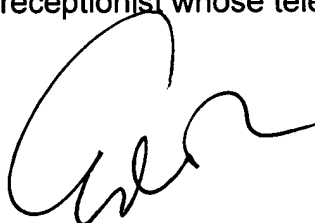
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Nguyen whose telephone number is (703) 308-1269. The examiner can normally be reached on Monday-Friday, 7:30 am- 4:30 pm

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned is (703) 308-7382 for regular communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JN  
December 10, 2002



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